

REMARKS

In response to the Official Action currently outstanding with respect to the above-identified application which Official Action the Examiner has designated as being FINAL, Applicants respectfully request that the subject application be amended as set forth hereinabove so as to place it in condition for allowance, or at least in better form for Appeal, as required by 37 CFR 1.116.

Claims 1-14 were pending at the time of the issuance of the currently outstanding Official Action. Claims 15 and 16 previously have been withdrawn from further consideration as being directed to a non-elected invention. By the foregoing Amendment Applicants propose the amendment of Claim 1. No claims are proposed to be added, and no claims are proposed to be cancelled. Accordingly, in the event that the Examiner grants entry to the foregoing amendment, the claims remaining under active prosecution in this application will be Claims 1-14 as hereinabove amended.

The text of the claims along with an appropriate indicator of the status of each is set forth hereinabove as required by the Rules.

In the currently outstanding Official Action, the Examiner has:

1. Failed to re-acknowledged Applicants' claim for foreign priority under 35 USC 119(a)-(d) or (f), and confirmed the receipt of the required copies of the priority documents by the United States Patent and Trademark Office as set forth in the previous Official Action in this application;
2. Indicated that the drawings as filed with this Application on 27 November 2001 are acceptable;

3. Provided Applicants with a copy of a Notice of References cited (Form PTO-892) along with copies of each of the newly cited references;
4. Provided Applicants with a Response to the arguments presented with their previous Amendment;
5. Rejected claims 1-5, 8, 9, 11 and 12 under 35 USC 102(b) as being anticipated by the Ito reference (JP 2-19194); and
6. Rejected claims 1-14 under 35 USC 102(e) as being anticipated by the Takeda, et al. reference (U.S. PG PUB. 2001/0020992).

No further comment is deemed necessary in these Remarks regarding items 1 - 3 above.

The foregoing Amendment proposes that Claim 1 be amended so as to clearly and distinctly state that each pixel is formed between and defined by the boundaries of an electrode on one of the substrates (i.e., the electrode opposite to the counter electrode in the scheme shown in the Ito et al reference). This amendment, therefore, makes explicit a feature that was heretofore implicit in Claim 1. Thus, Applicant respectfully submits that this feature would have been clear to one skilled in the art referring to page 29, lines 6-9 and Fig. 2 of the present specification. Specifically, each pixel electrode 4 is connected to the drain of a TFT 2 provided on the substrate. Further, Fig. 2 clearly shows that each pixel is formed between and defined by the boundaries of the pixel electrode 4 and the counter electrode 8.

With regard to items 4 - 6, Applicants have to following comments in support of the allowability of the foregoing claims.

First, with regard to items 4 and 5; Applicants understand the Examiner's rejection on the grounds of anticipation by the Ito reference to be based upon the fact that the counter electrode 35 shown in the drawings of the Ito reference has tilted surfaces in two directions. As has been noted previously, however, in the present invention it is assumed that the liquid crystal molecules are disposed substantially perpendicular to the substrate surface in the absence of applied voltage and substantially parallel to the substrate surface in the presence of an applied predetermined voltage. Hence, in the present invention when a potential between zero and the predetermined potential value is applied across the liquid crystal layer, the slant orientations of the molecules of the liquid crystal material are regulated in at least two predetermined directions by virtue of the tilted surfaces of the electrodes (see, for example, Figure 3 of the present application).

The Ito reference is different. The purpose in Ito is to uniformly obtain a result of a tilt orientation (presumably of the liquid crystal molecules) approximating that of a conventional homeotropic (perpendicular to the substrate) orientation thereof by the provision of electrodes inclined relative to the substrate surface.

In the currently outstanding Official Action, the Examiner suggests that Applicant's previous argument concerning the Ito reference is flawed because Ito's Fig. 3 shows prior art transparent electrodes 35 having no tilted surfaces resulting in a molecule tilt angle shown at reference numeral 41 or a predominant direction of the electric field between the electrodes and the counter electrode. From this basis, the Examiner concludes that Applicant's suggestion that the Ito reference discloses liquid crystal molecules having only one slant direction is somehow incorrect.

Applicants respectfully submit that the Examiner has misunderstood their interpretation of the Ito reference. Specifically, it is Applicants' position that the Ito reference discloses the use of slanted electrodes wherein there is a predominant direction of the electric field between the electrodes and the counter electrode. More specifically, Applicants respectfully submit that, as alluded to in its English language Abstract, the Ito reference utilizes the concept of a slanted electric field between the electrode and counter electrode to obtain a substantially uniform homeotropic orientation of the liquid crystal molecules. Therefore, in the Ito reference, the electric field between the electrode and the counter electrode is slanted by an angle 38 to the horizontal so as to overcome the prior art tendency of the liquid crystal molecules to tilt (as shown at the angle 41 in Ito's Fig. 3). That is to say that the angle 38 to the horizontal of the Ito electrodes creates an electric field between the electrode and counter electrode that slants at an angle equal to the angle 41 to the left of the vertical as shown in Fig. 3 of Ito so as to pull the liquid crystal molecule orientation substantially to the homeotropic orientation.

By the foregoing Amendment, Applicants propose that Claim 1 be amended so as to clearly reflect the foregoing distinctions. Further, Applicants respectfully submit that as so amended Claim 1 (as well as the claims that depend therefrom) cannot be interpreted in a manner such that the Ito reference would anticipate them. The reason for the difference is clear. In the present invention, the electrode/counter electrode configuration is always such that the different volumes of liquid crystal material between the respective tilted surfaces of the electrode and the counter electrode contain essentially distinct and uniformly directed electrical fields and associated lines of electrical force. Hence, the molecules slant differently in one "domain" associated with an electrode relative to the molecules in another "domain" associated with that electrode.

In the Ito reference, on the other hand, the directions of tilt of all of the surfaces of the various pixel-defining electrodes are effectively the same. Further, the counter electrode is configured such that it defines sections of close to the same size, shape and tilt angle as the opposite individual pixel-defining electrodes respectively, those sections being aligned with the individual electrodes. In the counter electrode, however, the inwardmost edge of each section is connected to the outwardmost edge of the next adjacent section by a differently tilted connection portion. Applicants respectfully submit, however, that the fact of the matter is that when a potential is applied across the liquid crystal material, the lines of electrical force between the counter electrode and the electrodes (with the minor exception of short portions adjacent to the connection portions) extend between the electrodes and the counter electrode at the angle shown at reference numeral 41 in Figure 3 of the Ito reference. In other words, there is a predominant (essentially single) direction of the effect upon the electric field between the electrodes and the counter electrode introduced by the tilt angles thereof in the Ito reference. Consequently, Applicants respectfully submit that the Ito et al reference is conceptually and structurally totally contrary to the domain concept taught by the present invention.

The presence of the small connecting portions between the larger tilted portions of the counter electrode 35 in the Ito reference, therefore, are respectfully submitted to be minimal and localized at best. They certainly do not function in any way to create multiple domains in each pixel. Rather, they merely serve as a convenience that incidentally also serves in conjunction with the spaces between the slanted opposing electrodes to separate the pixels defined between the longer counter electrode sections and the opposing separate electrodes.

Accordingly, in view of the foregoing amendment and remarks, Applicants respectfully request reconsideration and withdrawal of the currently outstanding rejection under 35 USC 102(b) in response to this communication.

With respect to item 4 and 6, Applicants now have amended the claims of this application so as to make it clear that the slanting of portions of the at least one electrode defining each pixel means that the entire surface of the electrode is tilted in one or another of the claimed directions. In view of this amendment, Applicants again respectfully submit that the Takeda et al reference is inapposite to the present invention.

As previously mentioned, the Takeda et al reference is directed to electrodes provided in a grid of singular points. To understand this point, it is to be recognized that the alignment of the liquid crystal molecules achieved by Takeda et al arises as a result of the arrangement of singular points defined by the interaction of protrusions from conventional parallel electrodes disposed in offset grid patterns on opposite sides of the liquid crystal layer, not as a result of tilts imparted to each of at least two particular sections of at least one of the conventional flat electrodes that define the entirety of at least one side of the associated pixel. Thus, it will be recognized that the tilts of the molecules in Takeda result from the interaction of singular points established by the interaction of insulative or conductive projections (or open "slots") of one otherwise conventional flat electrode with either an opposing plate-like counter electrode or a plurality of singular point counter electrode portions that are offset relative to the singular point of the electrode.

Thus, in a manner quite different from the present invention, Takeda (assuming a normal matrix singular point configuration associated with the electrode and offset relative to a similar configuration on the counter electrode) results in molecules slanting relative to each singular point in eight different directions, none of which being determined by a tilted surface of the either of the electrodes (as opposed to the insulative or conductive projections therefrom).

Therefore, the problem with the Examiner's reasoning on this point appears to reside in the fact that the Takeda singular point electrodes do not "define each pixel" in same manner in which the claimed electrodes "define the pixel". Specifically, the Claim 1 as amended now specifically requires the previously implicit limitation that electrodes on the opposing substrates "define the pixel" (i.e., the pixel is formed between, and defined by the boundaries of, the pixel electrode). In Takeda, on the other hand, the pixels are formed by singular point electrodes in combination with either opposing plate electrodes or a plurality of singular point electrodes that are offset relative to the singular point electrode. Therefore, Applicants respectfully submit that the Takeda reference's electrode structure cannot be said to "define each pixel" in the manner contemplated by the present claims. Further, Applicants respectfully submit that the Takeda reference does not reasonably suggest the definition of each pixel as contemplated by the present invention simply because the singular point electrodes disclosed therein may include multiple slanted sides.

Hence, it is respectfully submitted that Takeda et al is quite different in both construction and operation from the present invention as clarified by the foregoing Amendment. In view of the foregoing, Applicants again respectfully request reconsideration and withdrawal of the Examiner's currently outstanding rejection, and allowance of this application in response to this communication.

For each and all of the foregoing reasons and in light of the foregoing Amendment, Applicants respectfully submit that the foregoing amendment (if entered) (i) introduces no new issues requiring further consideration and/or search (the amendment being of a clarifying nature reflective of previously inherent claim features), and (ii) would place this application in condition for allowance, or at least in better form for Appeal, as required by 37 CFR 1.116. Hence, Applicants further respectfully submit that the Examiner's currently outstanding rejections of the claims of this application should be withdrawn and that this application now is in condition for allowance. A decision so holding and allowing Claims 1-11 as hereinabove amended in response to this communication, therefore, is respectfully requested.

Applicants also believe that additional fees beyond those submitted herewith are not required in connection with the consideration of this response to the currently outstanding Official Action. However, if for any reason a fee is required, a fee paid is inadequate or credit is owed for any excess fee paid, you are hereby authorized and requested to charge and/or credit Deposit Account No. **04-1105**, as necessary, for the correct payment of all fees which may be due in connection with the filing and consideration of this communication.

Respectfully submitted,

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